6.0 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This chapter summarizes what has been learned from this review of estimates of WTP for pollution-induced changes in morbidity and weighs the available estimates against what we would like to know for evaluation of environmental pollution control decisions. Suggestions for future research avenues are also made.

6.1 CONCLUSIONS REGARDING WTP (WTA) FOR CHANGES IN MORBIDITY

A summary of the studies reviewed in this report is provided in Table 6.1 Overall, very few satisfactory estimates of WTP for pollution-induced changes in morbidity have been obtained. Cost of illness (COI) studies provide the most comprehensive information, but theoretical analysis (Barrington and Portney 1982) and empirical evidence (Rowe and Chestnut, 1984) suggest that these estimates understate society's total WTP for changes in morbidity. Two contingent valuation (CV) studies provide WTP estimates for specific kinds of respiratory symptoms, which may be useful for policy decisions regarding those kinds of health effects, but they are not broadly applicable. The health production (HPF) studies have not provided any useful WTP estimates to date due to data limitations or restrictive theoretical assumptions. The health status index (HSI) studies provide interesting descriptions and rankings of health states but have not estimated WTP. The conclusions regarding each of these estimation approaches are discussed in more detail below.

Some general points have emerged during this review that are important to consider in any application of estimates of WTP (WTA) for changes in morbidity, whether new estimates are being made or whether estimates from previous studies are being applied.

1. Society's WTP and the individual's WTP may differ. What an individual is willing to pay to prevent **or** reduce his own morbidity may be less than what society (including the individual) is willing to pay to reduce or prevent his morbidity due to the availability of subsidized medical care and sick leave and due to the worry and inconvenience suffered by family and friends. It is possible to theoretically defiie

Table 6.1

Summar of Studies Reviewed

Authors (Year)	Type of Approach	Brief Description	Crucial ssum on	Data Sources	Important Findings (1983 dollars)	Usefulness for Pollution-Related Morbidity Valuation and Other Comments
Cropper (1981)	Health production function	An expression for WTP for changes in pollution was derived from a health production function model, and estimated for employed men ages 18 to 45 with work loss days as the measure of time spent sick and SO_2 as the pollution measure.	- Health affects the individual's well-being only via changes in time lost from work and in health enhancing or protecting expenditures. - Specific functional forms were assumed for the relationships in the model	Michigan Panel of Income Dynamics for 1970, 1974 and 1976.	The outcome of the theoretical analysis was that WTP is 2 times the value of time lost due to illness.	The usefulness is limited due to the restrictive assumptions of the model.
Gerking et al. (1983)	Health production function	An expression for WTP for changes in pollution was derived from a health production function model that incorporated direct utility effects of health. The WTP expression was then estimated for St. Louis residents and air pollution effects on health.	Individuals are able to obtain an optimal amount of preventive medical care and other defensive efforts such that the marginal costs equal the marginal benefits.	St. Louis Health Survey	The outcome of the theoretical analysis was that WTP can be expressed in relationships that are potentially observable.	The WTP estimates obtained are not useful for policy analysis due primarily to the limitations of the data used.
Harrington and Portney (1982)	Health production function	A health production function model was used to analyze the components of WTP for changes in pollution.	- Individuals are able to obtain an optimal amount of preventive medical care and other defensive efforts such that the marginal costs equal the marginal benefits. - The health production function is such that when pollution increases defensive efforts do not decrease and/or health does not improve.	None	The outcome of the theoretical analysis was that the individual's WTP can be expected to exceed COI incurred by the individuals.	The conclusions of the analysis support the use of COI estimates for as a lower bound for WTP.

Table 6.1

Summary of Studies Reviewed

(continued)

Authors	Type of Approach	Brief Description	Crucial Assumptions	Data Sources	Important Findings (1983 dollars)	Usefulness for Pollution-Related Morbidity Valuation and Other Comments
Cooper and Rice (1976)	Cost of illness — prevalence based	Developed cost of illness estimates covering medical expenditures and productivity losses due to all illness for 1972 for the U.S. divided into 16 major disease categories.	All costs were allocated according to primary diagnosis.	- National Center for Health Statistics - Health Care Financing Administration - National Diseases and Therapeutic Index - Current Population Survey	- Total direct medical expenditures in 1972 were $179,050 million. - Total productivity losses due to morbidity in 1972 were $100,728 million.	..he results can be used to estimate a lower bound on WTP for broad categories of illnesses when prevalence based costs are relevant and when the portion of illness (and costs) attributable to pollution can be estimated.
Hartunian et al. (1980, 1981)	Cost of illness — incidence based	Developed incidence based cost of illness methodology and estimates for 1975 for categories of disease: cancer, stroke, coronary heart disease and motor vehicle injuries.	Projections of future costs for cases begun in 1975 can be approximated by costs of previous cases.	Many -- see Table 3.9 (in full report)	- Incidence based costs are quite different than prevalence based costs. - Average total cost per incident (present value): Cancer: $64,818 Stroke: $47,232 Coronary Heart Disease: $38,450 Motor Vehicle Accidents: $6,253	The results can be used to estimate a lower bound on WTP for these categories of illnesses when incidence based costs are relevant and when the portion of illness (and costs) attributable to pollution can be estimated. Note: The reported results include losses due to premature death as well as morbidity.

Table 6.1

Summary of Studies Reviewed

(continued)

Authors (Year)	Type of Approach	Brief Description	Crucial Assumptions	Data Sources	Important Findings (1983 dollars)	Usefulness for Pollution-Related Morbidity Valuation and Other Comments
Loehman et al. (1979) and Loehman and De (1982)	Contingent valuation	A mail survey of Tampa, Florida, residents obtained WTP estimates for avoidance of minor and severe respiratory symptoms for 1 day, 1 week or 3 months each year.	- Mail survey is adequate for CV approach. - Preference for use of median rather than mean WTP.	General population survey	- Estimated median WTP for avoidance of 1 day of respiratory symptoms: minor - $3 to $8 severe - $11 to $18 - WTP was much higher for those without medical insurance. - WTP influenced by current health status.	- Relevant for short term respiratory symptoms. - Ambiguity in reference to decreases in existing symptoms or prevention of additional symptoms makes responses for 1 week and 3 months especially suspect.
Rowe and Chestnut (1984)	Contingent valuation	A study of asthmatics in a high pollution area near Los Angeles, in conjunction with a UCLA epidemiological study, to explore WTP versus COI for reductions in asthma symptoms and mitigating behavior.	- Use of individual defined "bad asthma day". - Ranking of benefits of reducing asthma symptoms can be interpreted so that WTP for benefits would be in same order.	Survey of a panel of asthmatics	- Mean WTP for a 50% reduction in "bad asthma days" per year: $400 or $21 per "bad asthma day" reduced. - Individual's WTP exceeds COI incurred by the individual by 1.6 to 2.3 times. - Provides evidence that mitigating behavior does occur.	- Relevant for valuation of impacts of air pollution as it aggravates asthma. - Conclusion that WTP exceeds COI 1.6 to 2.3 times is subject to interpretation of the rankings of benefits.
Brookshire et al. (1979)	Contingent valuation	Survey of Los Angeles area residents concerning WTP for reductions in air pollution, separating acute and chronic health effects and visibility effects.	- WTP to prevent health and aesthetic impacts are additive. - General public is able to reasonably assess air pollution impacts and provide meaningful valuation.	General population survey	- WTP to reduce health effects is about 2/3 of total WTP to reduce pollution, on average. - Income is positively related to WTP.	WTP estimates not useful for morbidity valuation due to uncertainty about the change in morbidity being valued.

Table 6.1

Summary of Studies Reviewed

(continued)

Authors (Year)	Type of Approach	Brief Description	Crucial Assumptions	Data Sources	Important Findings (1983 dollars)	Usefulness for Pollution-Related Morbidity Valuation and Other Comments
Loehman et al. (1981)	Contingent valuation	Survey of San Francisco area residents concerning WTP for reductions in air pollution, separating health and visibility effects. Replication of Brookshire et al. (1979).	General public is able to reasonably assess air pollution impacts and provide meaningful valuation.	General population survey	- WTP to reduce or prevent health effects is about 1/2 of total WTP to reduce pollution, on average, but WTP for health and visibility are not necessarily additive. - Current health and income affect WTP.	WTP estimates are not useful for morbidity valuation due to uncertainty about the change in morbidity being valued.
Schulze et al. (1983)	Contingent valuation	Survey of Los Angeles area residents regarding a severe ozone episode that recently occurred, asking WTP to prevent the episode, focusing on the health effects of high levels of ozone.	Responses about a specific episode in the past can be generalized.	General population survey	WTP is influenced by individual's preferences for outdoor recreation.	WTP estimates are not useful for morbidity valuation because interpretation of WTP to have avoided a past episode is not clear.
Sintonen (1981)	Health Status Index	A health index was developed using 12 health dimensions with 5 to 7 levels of health in each dimension. Two psychometric scaling techniques were used -- the category method and magnitude method -- by a general population sample to estimate weights for the index.	- An additive model implying independence between the health dimensions is appropriate. - Individuals can accurately rank the desirability of different health states.	General population survey	- Two health index functions were estimated using different scaling techniques. The value rankings implied by each function were closely correlated. - The survey participants indicated that the approach was understandable.	It is useful in that it constructs a ranking of health states that is based on function impairment and is disease independent with weights obtained from a general population survey. - This approach does not estimate the value in monetary terms of alternative health states. However, it provides a base description and ranking of health states that could be used in a

Table 6.1

Summary of Studies Reviewed

(concluded)

Authors (Year)	Type of Approach	Brief Description	Crucial Assumptions	Data Sources	Important Findings (1983 dollars)	Usefulness for Pollution-Related Morbidity Valuation and Other Comments
Torrance et al. (1982)	Health Status Index	A four dimensional health state classification system was used as the basis for a health status index. A multiattribute utility function was constructed that allowed for health dimensions to be either substitutes or complements.	A multiplicative functional form is an appropriate approximation of the individual's utility function -- independence between health dimensions was not assumed, but the interaction between the dimensions was subject to a number of constraints.	General population survey in Ontario, Canada	The study found the different health dimensions to be complements for the individuals interviewed. The condition of additive independence was tested and rejected. - Survey participants claimed to understand the questionnaire and procedures.	The study constructs a health status index based on a functional classification that is disease independent. This health state classification could be used in a contingent valuation study to obtain monetary valuations for changes in health status.
Rosser and Kind (1978)	Health Status Index	A simple set of health states was constructed using two dimensions -- one relating to physical and mental disability, and the second relating to pain and distress. An index for these health states was constructed using magnitude and ratio scaling methods.	The simplified health state classification system used is an adequate description of alternative health states.	A survey of health professionals and selected patients	- Individuals' perceptions of the desirability of health states changed over the course of the interview. - The rankings of states varied with current experience of illness but not past experience. - Socioeconomic variables did not influence health state rankings.	This type of simplified function/dysfunction analysis of health states that is disease independent could be very useful as a starting point for a contingent valuation study.

an individual's WTP (WTA) comprehensively as that which he is willing to pay to prevent or reduce his own and others' morbidity, but empirical estimates may or may not be comprehensive depending on how they are obtained. An evaluation of public policy requires consideration of all costs and benefits to society, so analysts should be clear about whether they have" estimates of the individual's or society's WTP(WTA).

2. <u>Acute and chronic illness should be approached differently.</u> Acute illnesses can typically be accommodated in an individual's life by temporary changes in work and leisure activities, allowing the individual to return to the same lifestyle once he or she recovers. Chronic illnesses, on the other hand, typically mean a permanent change in an individual's routine and lifestyle. In general, the estimation of WTP (WTA) for changes in acute illness is less complicate than for changes in chronic illness, because permanent lifestyle changes are difficult to evaluate. For example, CV surveys are known to be more effective when concerned with experiences that are familiar to respondents, implying that obtaining CV estimates for changes in the risks of getting short term respiratory infections would be less problematic than obtaining CV estimates for changes in the risks of getting a chronic condition such as emphysema with which the respondent has no experience. The impacts of developing a chronic condition have the potential of including substantial effects on family members and friends as well as on the affected individual. A long term disability can change the individual's role in a family and in a community. Current WTP (WTA) estimation approaches are very limited in their ability to quantify these kinds of impacts. Acute illnesses can also affect family, friends, employers and taxpayers, but these impacts are defined more easily.

3. <u>The appropriate measure of morbidity depends on the policy being evaluated.</u> For any effort to estimate WTP (WTA) for changes in morbidity, the change in morbidity must be clearly defined. It might be defined as a change in the number of people expected to come down with a specific, illness in a given time period, or it might be measured as a change in a general level of illness, such as work loss days or restricted activity days. It might also be measured as a change in some sort of health status dimension as was discussed in Chapter 5. The choice of a measure of morbidity will depend in part on the information available about the effects of the pollutants under consideration, and the choice of a morbidity measure will in turn influence the approach used for estimating WTP (WTA) for the change in morbidity.

4.   <u>WTP (WTA) for changes in morbidity is influenced by the current health of the individual.</u> The re is some evidence that individuals who are in worse health are willing to pay more to prevent additional morbidity or to reduce current morbidity. This is consistent with what might be expected on theoretical grounds since those with lower health levels may value increments of health more highly. This is im portant for environmental policy considerations because in many instances it is a "sensitive" population that already has some health problems that is at risk rather than the gene ral public.

Health Production Function Approaches

The WTP (WTA) numbers estimated to date using HPF approaches are not directly useful for policy purposes due to data limitations and/or restrictive model assumptions. In spite of this pessimistic conclusion about the numerical results of these studies, the analyses presented in the HPF studies have helped to define the expected components of an individual's WTP (WTA) for changes in morbidity, and point to some potentially useful av-**enues** for future research.

Cropper (1981) made reasonable, but arbitrary, assumptions about the functional forms of the equations in an HPF model of individual behavior with regard to health. The expression for WTP (WTA) derived from this model is equivalent to two times the opportunity cost of time spent sick. The Cropper model does. not incorporate effects on the individual's we ll-being due to direct medical expenditures or pain and discomfort as a result of illness. The results of the analysis, therefore, indicated that WTP (WTA) for change in. morbidity can be expected to exceed the opportunity cost of time spent ill, but by how much remains unknown.

The HPF model developed by Gerking <u>et al.</u> (1983) incorporates the direct pain and discomfort associated with illness, so that the model is less restrictive than Cropper% model. The authors derive an expression for WTP (WTA) from which this difficult-to-observe discomfort component has been eliminated. The critical assumption behind this derivation is that individuals are able to choose a level of preventive medical care at which the marginal price of that care to the individual just equals the value of the marginal change in health obtained. A problem with this assumption is that there are some health effects for which there are no effective medical care procedures so that the

individual may be forced to tolerate a an undesirable level of health. Nonetheless, the expression derived for WTP (WTA) shows promise for empirical estimation because all its terms are potentially observable. It requires information about the relationship between medical care and health and about the price of medical care. The estimation of this expression offered by the authors, however, is not very use ful primarily because the measure of medical care used was not adequate.

The health production function models (specifically that presented by Harrrington and Portney, 1982) have demonstrated that under reasonable assumptions an individual's WTP (WTA) for changes in morbidity can be expected to exceed the individual's opportunity costs of time spent sick and the direct medical expenditures incurred by the individual. The models that have been applied to pollution-induced morbidit y are, however, only useful for anal yzing WTP (WTA) for marginal changes in health, which basically means they are limited to acute illness. Empirical applications of HPF models also may be more suited to general changes in morbidity rather than specific diseases because they are based on an analysis of individual behavior with regard to his or her overall state of health.

Cost of Illness Approaches

The cost of illness studies provide dollar estimates of direct medical expenditures and income or production lost due to illness, both for broad categories of illness and for spe- cific diseases. In many instances these numbers are useful for approximating a lower bound for society's total WTP (WTA) for changes in illness. The costs estimated in these studies usually cover those incurred by the ill individual as well as those paid by insur- ance, government, employers, etc.

Most COI studies estimate total costs associated with all cases of an illness or disease. Since in most cases changes in environmental pollution are associated with changes in the amount of illness that occurs (it is seldom the sole cause of any particular illness), some assumption must be made about how these costs will change with a change in the level of illness, if these COI estimates are going to be applied for changes in pollution. It is often assumed that changes in COI are proportional to the changes in illness (i.e., the marginal costs associated with the pollution induced change in illness are assumed to be approxi- mated by the average costs of the illness). The validity of this assumption depends "on

who is affected by pollution and how they are affected. For example, this assumes that the pollution affected population is representative of the population of all people with that illness in terms of "socioeconomic characteristics, such as income. It also assumes that the pollution induced health effect is typical of most cases of that illness in terms of medical costs. The validity of these assumptions and the possibility y of making adjust-men ts when they are not considered acceptable will have to be considered on a case by case basis.

No attempt was made in this report to review the entire cost of illness literature. Hu and Sandifer (1981) review 238 studies estimating costs associated with specific dis-eases. Many of these might be relevant for pollution related morbidity. Two important CO1 studies were reviewed to illustrate the estimation methods used and the kind of information available in these studies. Cooper and Rice (1976) provide national COI estimates for 16 categories of illness, covering all illness in the U.S. in 1972. These est-imates have been referenced frequently and applied to changes in pollution re lated illness by several authors.. (See Manuel et al. 1983 and Lave and Seskin 1977 "f or exam pies.) They are useful for general categories of illnesses, but less so for specific diseases.

The other cost' of illness study reviewed (Hartunian et al. 1980, 1981) was selected be-cause it presents incidence based estimates rather than the prevalence based estimates given by Cooper and Rice and most other COI studies. Incidence based estimates are for all the costs associated with the cases of an illness that begin in a given time period, from the onset of the illness until recovery or death occurs. Prevalence based estimates are for all the costs incurred in a given time period for all cases of illness active in that time period, regardless of when the illness began.For very short term illnesses, inci-dence and prevalence based costs are not significantly different, but for long term ill-nesses suspected of being caused by environmental pollution, incidence based costs are more appropriate than prevalence based costs because a change in pollution would cause a change in the number of new cases. On the other hand, pollution is sometimes sus-pected of aggravating existing illnesses, in which case prevalence based COI estimates would be more appropriate.

Contingent Valuation Approaches

Two CV studies reviewed provide estimates of WTP for changes in specific kinds of **mor**bidity: acute respiratory symptoms for the general population and changes in the frequency of symptoms for people who already have asthma. Due to uncertainties in any CV estimation, these numbers should be cautiously used until they are verified in repeated estimations. CV approaches of this type seem to be most applicable for changes in acute illness that are familiar to the survey population (this includes aggravation of chronic conditions for those who already have the condition).

The results of the study by Loehman et al. (1979) are applicable for the prevention of some short term respiratory symptoms. These include shortness of breath, head congestion and coughing/sneezing. These symptoms were characterized as minor, causing little interference with normal daily activities, or severe, causing considerable interference with normal daily activities. Median WTP estimates obtained were highest for shortness of breath and lowest for coughing/sneezing. Median WTP to prevent one day of minor symptoms ranged from about $3 to $8, (1983 dollars), and to prevent one day of severe symptoms. ranged from about $11 to $18. Mean values are "more appropriate for benefit-cost analysis, but the mean responses were much higher and were suspect due to" **some very** high WTP responses that may have ref lected objection to the questions. Several ambiguities and problems with the survey instrument would have to be cleared up in future efforts of this kind.

Rowe and Chestnut (1984) fared mean WTP by a sample of asthmatics for a 50 percent reduction in "bad asthma days" to be about $400 (1983 dollars) per year. The respondents were asthmatics with an average of 38 "bad asthma days" per year, so this was an average of about $21 per bad asthma day reduced. This is somewhat higher than the values estimated by Loehman et al. (1979), which is consistent with the expectation that a group of chronically ill individuals might have higher WTP for reductions in morbidity. **The** results of this study also indicate that an individual's WTP for a reduction in asthma symptoms is as much as 1.6 to 2.3 times the estimated sum of direct medical expenditures and income lost incurred by the individual.

Other contingent valuation studies were discussed that do not provide estimates of WTP for specific changes in morbidity, but provide some information about WTP for changes in pollution levels that are associated with health effects. The results of these studies

and the two mentioned above support the following points concerning WTP for changes in morbidity:

o   WTP to prevent a deterioration in health can be expected to exceed WTP to obtain the same size improvement in health.

o   WTP of people in poor health tends to exceed WTP of people in good health.

o   Higher household income may mean higher WTP.

o   Total WTP of men and women are not significantly different (in contradiction to COI estimates that show higher values for men due to higher wages).

o   Insurance coverage may mean lower individual WTP.

Health Status Index Studies

The health status index studies reviewed do not provide any dollar estimates of value for changes in morbidity, but they provide guidelines for characterizing of changes in morbidity that could be used in future valuation studies. The health status classifications developed in this literature are typically function and symptom oriented, not disease specific. This function/dysfunction approach is appealing for benefits analysis because it incorporates the factors that directly influence an individual's quality of life with regard to health. In addition, a suitable health status classification system could simplify the benefits estimation problem.   The number of possible health effects that are environmentally caused or aggravated is large. It would be very difficult and may not be appropriate to conduct a separate benefits study for each illness. A more tractable approach may be to define a set of health dimensions, similar to those developed by Torrance et al. (1982), Sintonen (1981) and Rosser and Kind (1978), that could be used to characterize the health effects of different pollutants.   Changes in these function/dysfunction based health states could then be valued and used to deduce the benefits of preventing or reducing illnesses that cause these symptoms.   This classification system could incorporate a time dimension so that both chronic and acute

effects could be included. However, health status index studies to date have not incorporated time in this way.

Some of the HSI studies have asked individuals to rank different health status levels according to the perceived disutility, or utility? associated with each, and the results of these rankings point to some considerations for future surveys concerning the valuation of health. Rosser and Kind (1978) demonstrate that individuals do not necessarily have well formulated values, especially with respect to health states with which, they have no previous experience. When **conducting CV studies** or surveys to construct a health status index, the standard assumption is that individuals have well formulated values and the goal of the survey is to elicit those values. However, in some instances individuals may not have previously considered the tradeoffs in the way they are being addressed in the study and may have to formulate their opinions during the course of the interview. Some respondents found that their values had changed from the beginning to the end of the exercise. This means that the survey instrument itself is extremely important because it can influence this value form ulation process.

Rosser and Kind (1978) investigated whether different socioeconomic subpopulations rated the health states differently. They found no significant differences between the ratings of the subgroups, except for those with different current health problems.

Most HSI surveys were well "received by the subjects. Sintonen (1981) reported that the subjects generally found the questions easy to understand, although sometimes difficult to answer. Also, few subjects objected to the elicitation or found the questions impossible to answer. The HSI surveys may be more favorably received than similar willingness to pay studies would be, due to the additional difficulties of valuing changes in health in dollar terms.

6.2 RECOMMENDATIONS FOR FUTURE RESEARCH

Given the overall conclusion that we know very little about dollar values for changes in morbidity, additional research in any of the areas discussed would be useful. This section focuses on some specific research suggestions aimed at improving information about WTP (WTA) for" changes in morbidity and applying the estimation techniques in ways for which they are most suited. They are presented roughly in order of priority, as perceived by these authors.

A contingent valuation Survey concerning work loss days and restricted activity days

Data on work loss days (WLD's), restricted activity days (RAD's) and bed days (BD's) due to illness are collected annually for the U.S. population by the National Center for Health Statistics (N CHS). These data have been used in several epidemiological studies concerning the health effects of pollutants. (See for exam pies Ostro, 1983, and Portne y and Mullahy, 1983.) Estimates of dollar values for changes in these measures of morbidity have typically been based simply on the average wage rate as a pm xy for the opportunist y cost of time spent sick. This can be expected to provide a lower bound on total social WTP for changes in WLD's, RAD's or BD's, but how much actual WTP might be is unknown. Better measures of value for changes in WLD's, BD's and RAD's would be useful because these measures of health effects are likely to continue to be extensively used. A suitable application of a CV approach would be to estimate individual WTP to reduce or prevent WLD's, RAD's, and BD's. Short term illnesses that interfere temporarily with normal daily activities are familiar experiences for most people, and are therefore readily addressed in a CV survey.

It might be best to begin a CV questionnaire for this purpose with a subset of the NCHS medical history and socioeconomic questions, including the WLD, RAD and BD questions. This would ensure comparability to this important source "of morbidity data. The next step would be to ask additional questions to help interpret WLD's, RAD's and BD's in terms of effects on the individual's well-being. This would include whether the individual has paid sick leave or medical insurance coverage, type of job, job satisfaction? frequency and severity of illness associated with WLD's, RAD's and BD's, and degree of distress, discomfort and inconvenience. These questions would set the stage for the WTP questions that would follow. As with all CV survey instruments, the WTP questions would require a realistic payment mechanism and careful framing to minimize ambiguities in the interpretation. It would also be useful to ask respondents how they view out-of-pocket costs associated with WLD's, RAD's and BD's relative to their total WTP, in order to compare COI estimates with WTP. The distinction between costs of illness incurred by the individual and those incurred by other parties would have to be addressed here, as well as whether they view their health insurance premiums as part of their illness-specific costs.

An important problem that would have to be addressed in a CV study concerning WTP to prevent or reduce WLD's, RAD's and BD's is that these can reflect very different

severities of illness. WTP can be expected to vary with severity of illness. Asking respondents about how sick they have to be before they change their activities and about the severity of illness associated with recent WL D's, RA D's, **and** BD's would assist in the interpretation of WTP responses concerning "typical" WLD's, RAD's, or BD's.

It should be noted that WTP for changes in WLD's, RAD's and BD's, even if accurately estimated, will not capture the full effects of a change in environmental pollution because health effects that may be annoying but do not restrict activity and defensive responses to a change in environmental pollution will not be reflected in the WLD, RAD and BD measures.

Health status indices and benefits research

The research on health status characterization and indices may provide a useful starting point for obtaining economic values for changes in health in a CV study. These health status classifications emphasize the function/dysfunction aspects of illness, including such things as the ability to perform the usual activities for an individual's social role as well as certain "quality of life" aspects. This type of health measure would be useful for pollution control benefits studies because it can reflect factors that affect quality of life and can incorporate a wide variety of health effects because it is disease independent.

A health status classification that encompasses the functional effects of a variety of environmentally caused or aggravated illness need not be complicated. The classification used by Rosser and Kind (1978), for example, resulted in thirty-two combinations describing different health states. This is few enough to allow for the direct valuation of changes between states using CV methods. The more complicated classification systems used by Sintonen (1981) or Torrance et al. (1982) would require each health dimension to. be valued independently and then combined with the others using multi-attributable methods and assumptions.

A study of this type would require the following steps:

Step 1: Identif y the pollution induced" illnesses that are expected to be important in evaluating pollution control policy issues. The institute of Medicine (1981) has compiled tables of known and suspected pollution-related health effects that could be used as a starting point.

Step 2:   Define the health dimensions and levels within the dimensions needed to represent**the health** effects in terms of function/dysfunction. It may be appropriate to have two separate sets of health dimensions -- one to describe acute effects and another to describe chronic effects.

Step 3: Develop a mapping between the pollution induced illnesses and the function oriented health status classification so that chan ges in the incidence of illnesses can be translated into changes in health states for a specific **number of people**.

Step 4:   Desire a survev instrument to elicit values in monetarv terms for movements from one health state to another, using either direct valuations if the number of health states is small, or using m ul ti-a ttribute techniques if the number of states is large. include consideration of characteristics of the individual such as current health status and income, that might influence the valuation.

Health production function estimation

The estimation of . WTP for changes in morbidity by Gerking et al. (1983) was not an adequate demonstration of the possibilities of the HPF approach due to the limitations of the data that were used. An estimate of the expression for WTP that Gerking et al. derived from the HPF model would be useful because the model incorporates the pain and suffering associated with illness for the individual, although the theoretical Iim itations of the model would first have to be thoroughly explored. The estimation of this expression for changes in pollution requires an estimate of the health production function -- the relationship between health and medical care, pollution and other characteristics of the individual -- and an estimate of the price of medical care. A survey probably would be needed to obtain adequate data for this estimation.[1] The medical care data would need to focus on preventive activities and expenditures as well as more conventional medical care. A distinction would need to be made between efforts to maintain **a** desired health *state* and medical care in response to illness that has already occurred.

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[1] Before an expensive data collection effort were undertaken, it would be necessary to work through the theory underlying the analysis plans very carefully. The issues raised by Bockstael and McConnell (1983) concerning the problems in estimating the demand for health would need to be addressed to determine their implications for the estimation of a health production function.

Choosing the appropriate measure of the individual's health would be more problematic than defining the appropriate medical care information. To be consistent with the spirit of the HPF mode l, the health measure should be a fairly general measure of the individual's health and should have a wide enough range to vary significantly across different people.It should also be clearly related to the medical care measure being used. The measure used by Gerking et al. (1983) was whether and for how long the individual had any chronic condition. A measure that reflects more short term changes in health would be preferable given that the expression for WTP is for marginal changes in health. Restricted activity days or work loss days could be considered. Alternatively, it might be possible to f ecus on a sensitive population group that has more specific health problems. Appropriate data on the individual's exposure to pollution would also need to be obtained. The estimate of the price of medical care should include both time and dollar expenditures by the individual.

Several sets of data compiled by NCHS should be examined for potential usefulness in the estimation of a health production function. One of these is the National Medical Care Utilization Expenditure Survey which contains detailed information from a 1980 survey on the countr y's health status, patterns of medical care utilization, charges for services received, and methods of payment. Also of potential interest are the National Survey of Personal Health Practices and Consequences, the Hospital Discharge Survey, and the National Ambulatory Medical Care Survey. The health economics literature on the demand for medical care (e.g., Acton 1975) should also be reviewed.

Cost of illness studies

The priorities for research concerning the value of changes in morbidity for use in benefit-cost should be to develop estimates of willingness to pay. However, the lack of adequate estimates of willingness to pay for changes in morbidity means that COI estimates will continue to be useful. It will therefore be important to keep track of new developments in the COI literature, especially in the area of incidence based costs. Improved information about marginal costs of illness versus average costs and about per person or per incident costs would also be useful for applications to pollution control issues as would more empirical analysis on the relationship between WTP and COI. It would be useful to develop a COI estimation procedure that is fairly easy to implement and that has a known relationship (maybe proportional) to what we expect the "true" WTP to be.

Morbidity as Related to Mortality.   Many regulatory actions will affect both morbidity and mortality, so that it may be difficult to find data sets where the two effects can be assessed separately particularly when chronic illness is involved. Since the **policy** need is for a total benefit measure, a useful theoretical development would be the creation of models that combine morbidity and mortality considerations. One step in this direction wou Id be the extension of morbidity models to allow for multiperiod decision making. Then the benefits could be calculated for present actions that reduce future time spent sick (or severity), leading to a better understanding of trade-offs that are not easy to include in a single period model. The separability of morbidity and mortality could be addressed in such a model.
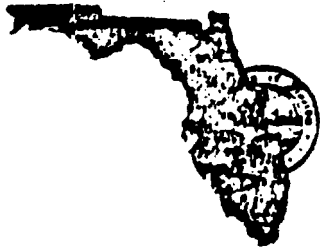
ICAAS

UNIVERSITY OF FLO[...]
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GAINESVILLE, FLORIDA [...]
AREA CODE 904 PHONE 3[...]

DEPARTMENTS
FOOD AND RESOURCE ECONOMICS   ECONOMICS
PHYSICS AND ASTRONOMY CHEMICAL ENGINEERING
NUCLEAR ENGINEERING SCIENCES   PSYCHOLOGY
J. HILLIS MILLER HEALTH CENTER

Dear Citizen:

 Several organizations in Florida are trying to determine what values people place on respiratory health. We are sending you this questionnaire so that you can tell us what your values axe. *YOUR ANSWERS WILLBE EXTREMELY IMPORTANT FOR DECISIONS THAT MAY HAVE A DIRECT EFFECT ON HEALTH AND INCOME FOR YOU AND YOUR FAMILY.*

 The success of the survey depends on your prompt and complete response. It should not take more than 15 minutes to fill out this form. You need no e give your name, so there will be no way that we can identif y you as the person who returned this form. When you have answered all the questions, please place the questionnaire in the self-addressed, stamped envelope and drop it in the nearest mailbox. Your quick response will be most helpful to this survey.

 Thank you for your time and help.

Sincerely,

E T Loehman

E. T. Loehman
Research Associate

ETL:mp

APPENDIX

Survey   Instruments

Loehman et al. (1979)

Survey Instrument

QUESTION 3

THINGS YOU MIGHT BUY OR USE OR DO TO MAKE YOUR OR YOUR HOUSEHOLD'S ASTHMA LESS OF A PROBLEM:

MEDICATIONS FOR ASTHMA

AIR PURIFIER

INTERMITTENT POSITIVE PRESSURE BREATHING MACHINE (IPPB)

HAND HELD NEBULIZATION MACHINE

MASKS

OXYGEN

SPECIAL TREATMENT PROGRAMS (SPECIFY)

RELANDSCAPING THE YARD

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

QUESTION 7

WHICH OF THE FOLLOWING DESCRIBE YOUR PRESENT EMPLOYMENT STATUS?

    A.   EMPLOYED FULL-TIME

    B.   EMPLOYED PART-TIME

    C.   HOMEMAKER

    D.   RETIRED

    E.   RETIRED DUE TO HEALTH PROBLEMS

    F.   STUDENT

    G.   NOT PRESENTLY EMPLOYED, BUT LOOKING FOR EMPLOYMENT

    H.   OTHER (SPECIFY)

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

PLEASE INDICATE THE ANSWERS THAT DESCRIBE HOW YOUR ASTHMA AFFECTS YOUI? CURRENT EMPLOYMENT STATUS,

A. MY ASTHMA IS NOT IMPORTANT OR IS OF MINOR IMPORTANCE TO MY CURRENT EMPLOYMENT STATUS.

B. BECAUSE OF MY ASTHMA, I AM A HOMEMAKER, A STUDENT, RETIRED, OR UNEMPLOYED.

C. BECAUSE OF MY ASTHMA, I DO NOT WORK AT ALL DURING PART OF THE YEAR (PLEASE INDICATE WHICH SEASONS)

D. BECAUSE OF MY ASTHMA, I WORK ONLY PART-TIME YEAR ROUND

E. BECAUSE OF MY ASTHMA, I WORK ONLY PART-TIME DURING' PART OF THE YEAR . (PLEASE INDICATE WHICH SEASONS)

F. OTHER, PLEASE EXPLAIN.

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

QUESTION 13A

PLEASE THINK ABOUT A SITUATION WHERE YOU ARE OFFERED A JOB SIMILAR TO YOU NOW HAVE, BUT YOU COULD EXPECT TO HAVE BAD ASTHMA DAYS ABOUT HALF OFTEN AS YOU DO NOW.

WHAT WOULD BE THE BIGGEST PAY CUT YOU WOULD ACCEPT AND STILL TAKE THE JOB? THE LIST OF DOLLAR AMOUNTS IS ONLY TO HELP YOU. PLEASE FEEL FREE SELECT A LISTED AMOUNT OR GIVE ANY OTHER AMOUNT.

HOURLY " PAY CUT		PAY CUT PER 40 HOUR WEEK		PAY CUT FULL TIME
$ 0.00	=	$ 0.00	=	$ 0.00
.10	=	4.00	=	200.00
.20	=	8.00	=	400.00
.30	=	12.00	=	500.00
.40	=	16.00	=	800.00
.50	=	20.00	=	1000.00
.75	=	30.00	=	1500.00
1.00	=	40.00	=	2000.00
1.25	=	50.00		2500.00
1.50	=	60.00	=	3000.00
1.75	=	70.00	=	3500.00
2.00	=	80.00	=	4000.00
3.00	=	120.00	=	6000.00
4.00	=	160.00	=	8000.00
5.00	=	200.00	=	10,000.00
6.00	=	240.00	=	12,000.00
7.00	=	280.00	=	14,000.00
8.00	=	320.00	=	16,000.00
9.00	=	360.00	=	18,000.00
10.00	=	400.00	=	20,000.00

IF GREATER THAN $10.00/HOUR PLEASE GIVE THE AMOUNT.

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

QUESTION 13ʙ

Wʜɪᴄʜ OF THE FOLLOWING REASONS BEST EXPLAIN YOUR ANSWER TO THE PREVIOUS QUESTION #13ᴀ?

       A. Hᴀᴠɪɴɢ Bᴀᴅ Aꜱᴛʜᴍᴀ Dᴀʏꜱ ʜᴀʟꜰ ᴀꜱ OFTEN WOULD NOT BE WORTH ANY AY CUT.

      B. I COULDN'T GET BY WITH LESS PAY THAN I NOW RECEIVED

      C. I DON'T BELIEVE THAT A JOB CHANGE COULD REDUCE MY ASTHMA THAT MUCH.

      D. I WOULD NOT WANT TO GIVE UP THE OTHER BENEFITS OF MY CURRENT JOB.

      E. Oᴛʜᴇʀ (Pʟᴇᴀꜱᴇ Sᴘᴇᴄɪꜰʏ)

PLEASE WAIT ꜰᴏʀ INSTRUCTIONS BEFORE CONTINUING

QUESTION 15A

PLEASE THINK ABOUT A SITUATION WHERE YOU ARE OFFERED A JOB SIMILAR TO W **YOU NOW** HAVE, BUT YOU COULD EXPECT TO HAVE BAD ASTHMA DAYS ABOUT TWIC OFTEN AS YOU DO NOW.

WHAT WOULD BE THE SMALL<u>EST **PAY INCREASE** **YOU**</u> WOULD REQUIRE TO TAKE THE JOB? THE LIST OF DOLLAR AMOUNTS IS ONLY TO HELP YOU. PLEASE FEEL FREE SELECT A LISTED AMOUNT OR GIVE ANY OTHER AMOUNT,

HOURLY PAY INCREASE		PAY INCREASE PER 40 HOUR WEEK		PAY INCREASE FULL TIME
$ 0.00	≡	$ 0.00	≡	$ 0.00
.10	≡	4.00	≡	200.00
.20	≡	8.00	≡	400,00
.30	≡	12.00	≡	600.00
.40	≡	16.00	≡	800.00
.50	≡	20.00	≡	1000.00
.75	≡	30.00	≡	1500.00
1.00	≡	40.00	≡	2000.00
1.25	≡	50.00		2500.00
1.05	≡	60.00	≡	3000.00
1.75	≡	70.00	≡	3500.00
2.00	≡	80.00	≡	4000.00
3.00	≡	120.00	≡	5000.00
4.00	≡	160.00	≡	8000.00
5.00	≡	200.00	≡	10,000.00
6.00	≡	240.00	≡	12,000.00
7.00	≡	280.00	≡	14,000.00
8.00	≡	320.00	≡	16,000.00
9.00	≡	360.00	≡	18,000.00
10.00	≡	400.00	≡	20,000.00

IF GREATER THAN $10.00/HOUR PLEASE GIVE THE AMOUNT.

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

QUESTION 15B

WHICH OF THE FOLLOWING REASONS BEST EXPLAINS YOUR ANSWER TO THE PREVIOUS QUESTION #15A?

A. NO PAY INCREASE WOULD MAKE ME MILLING TO HAVE BAD ASTHMA DAYS TWICE AS OFTEN.

B. I DON'T BELIEVE THAT A JOB CHANGE COULD INCREASE MY ASTHMA THAT MUCH.

C. I WOULD NOT WANT TO GIVE UP THE OTHER BENEFITS OF MY CURRENT JOB.

D. OTHER (PLEASE SPECIFY)

PLEASE WAIT FOR INSTRUCTION BEFORE CONTINUING

QUESTION 18

Please think only ABOUT those chores THAT YOU USUALLY DO THAT NEED TO BE DONE MOST EVERY DAY. When You have a Bad Asthma DAY, or a period of TIME WITH FREQUENT Bad Asthma Days, how do these CHORES THAT YOU USUALLY DO GET DONE? Please pick the BEST ANSWERS.

A. I USUALLY STILL DO THEM, BUT THEY ARE LESS ENJOYABLE.

B. I USUALLY STILL DO THEM, BUT IT TAKES LONGER.

C. I USUALLY STILL DO THEM, BUT AT A DIFFERENT TIME OF DAY.

D. I USUALLY HAVE SOMEONE ELSE IN THE HOUSEHOLD DO THEM.

E. They usually just don't get done that day.

F. Usually someone outside of the household does them (SUCH AS GOING OUT TO EAT, HIRING A HOUSECLEANER, ETC.)

G. Other - Please Explain.

PLEASE WAIT FOR INSTRUCTION BEFORE CONTINUING

QUESTION 21

WHEN YOU ARE HAVING A BAD ASTHMA DAY THAT AFFECTS YOUR LEISURE ACTIVITIES, WHICH OF THE FOLLOWING DESCRIBE HOW YOUR LEISURE ACTIVITIES ARE AFFECTED? PLEASE PICK ALL THAT APPLY.

A. I USUALLY CHANGE THE TYPES OF ACTIVITIES I DO.

B. I USUALLY DO THE SAME ACTIVITIES, BUT AT A DIFFERENT TIME OF THE DAY.

C. I USUALLY SPEND LESS TIME ON LEISURE ACTIVITIES.

.

PLEASE WAIT FOR INSTRUCTION BEFORE CONTINUING

QUESTION 26

BY MOVING, WHAT THINGS THAT WORSEN YOUR (OR YOUR HOUSEHOLD'S) ASTHMA WOULD YOU BE AVOIDING?

A. STRESS, TENSION, ANXIETY

B. AIR POLLUTION

C. POLLENS, PLANTS AND ANIMALS

D. WEATHER IN THIS AREA

E. OTHER - PLEASE EXPLAIN .

PLEASE WAIT FOR INSTRUCTION BEFORE CONTINUING

QUESTIONS 27 AND 28

WHICH OF THE FOLLOWING REASONS EXPLAIN WHY YOU WOULD NOT MOVE?

A. FAMILY AND FRIENDS HERE.

B. JOB HERE

C. THE CHANGE IN ASTHMA WOULD NOT BE IMPORTANT ENOUGH

D. THE MOVING COSTS WOULD BE TOO HIGH

E. I DON'T BELIEVE THERE IS ANY PLACE IN THE LOS ANGELES AREA WHERE MY ASTHMA COULD BE THAT MUCH BETTER.

F. OTHER (PLEASE SPECIFY)

.

PLEASE WAIT FOR INSTRUCTION BEFORE CONTINUING

QUESTION 29

HERE ARE SOME POSSIBLE BENEFITS YOU MIGHT RECEIVE FROM HAVING YOUR ASTHMA IMPROVE, PLEASE TAKE YOUR TIME AND <u>RANK THEM FROM</u> MOST IMPORTANT TO LEAST IMPORTANT EXCLUDE ANY THAT ARE OF NO IMPORTANCES

A. LOWER EXPENDITURES ON DOCTORS, HOSPITALS, MEDICINES, SPECIAL EQUIPMENT ANO SERVICES.

B. HIGHER PRODUCTIVITY AT WORK OR ABILITY TO GET HIGHER WAGES AND SALARIES.

C. MORE FLEXIBILITY ABOUT WHERE TO LIVE.

D. BETTER CHANCE TO PARTICIPATE IN DESIRED LEISURE, RECREATION AND SOCIAL ACTIVITIES.

E. LESS PAIN AND SUffering

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

QUESTION 30A

IF FEDERAL, STATE OR LOCAL GOVERNMENTS SET UP PROGRAMS THAT COULD REDUCE POLLENS, DUSTS, AIR POLLUTANTS AND OTHER FACTORS THROUGH-OUT THIS AREA THAT MIGHT REDUCE YOUR (AND YOUR HOUSEHOLD'S) BAD ASTHMA DAYS BY HALF, BUT WOULD COST YOU INCREASED TAX DOLLARS, WHAT WOULD BE THE **MAXIMUM INCREASE** IN TAXES EACH YEAR THAT YOU AND YOUR HOUSEHOLD WOULD BE WILLING TO PAY AND STILL SUPPORT SUCH A PROGRAM? THE LIST OF DOLLAR AMOUNTS IS ONLY TO HELP YOU, PLEASE FEEL FREE TO SELECT A LISTED AMOUNT OR GIVE ANY OTHER AMOUNT.

$0	$75	$300	$2000
$10	$100	$400	$3000
$20	$125	$500	$4000
$30	$150	$600	$5000
$40	$175	$700	$5000
$50	$200	$800	$7000
		$900	$8000
		$1000	$9000
			$10,000

PLEASE WAIT FOR INSTRUCTIONS BEFORE CONTINUING

WHICH OF THE FOLLOWING REASONS BEST EXPLAINS YOUR ANSUER TO THE PREVIOUS QUESTION #30A?

A. HAVING BAD ASTHMA DAYS HALF AS OFTEN WOULD NOT BE WORTH ANY INCREASE IN TAXES.

B. OUR TAXES ARE ALREADY TOO HIGH.

C. I DON'T BELIEVE ANY SUCH PROGRAM COULD REDUCE MY BAD ASTHMA DAYS BY HALF.

● D. I SHOULD NOT HAVE TO PAY FOR SUCH PROGRAMS: THEY SHOULD BE UNDERTAKEN BY GOVERNMENT AND INDUSTRY WITHOUT ANY INCREASE IN TAXES.

E. OTHER (PLEASE SPECIFY)

PLEASE WAIT FOR INSTRUCTION BEFORE CONTINUING

QUESTION 31

PLEASE GIVE THE CODE LETTER OF THE CATEGORY THAT BEST DESCRIBES THE COMBINED BEFORE-TAXES INCOME THAT YOU AND ALL OTHER MEMBERS OF YOUR HOUSEHOLD EXPECT TO RECEIVE IN 1983,

A. UNDER $5,000
B. $5,000 - $9,999
C. $10,000 - $14,999
D. $15,000 - $19,999
E. $20,000 - $24,999
F. $25,000 - $29,999
G. $30,000 - $34,999
H. $35,000 - $39,999
I. $40,000 - $44,999
J. $45,000 - $49,999
K. $50,000 - $54,999
L. $55,000 - $59,999
M. $60,000 AND OVER

THANK YOU. WE APPRECIATE

Rowe and Chestnut (1984)

Survey Instrument

☐ 1
1

☐☐☐ ID#
2 3 4

☐ 1 CARD #
5

☐ INTERVIEWER #
ᵘ

These questions **have** to do with how your **asthma affects** your health expenditures, **your** w i n k , y o
leisure, and where you live. Some **questions** are similar to **those in** earlier UCLA **questionnaires. This
done so that we will have the most up-to-date information.**

Your responses w ill help improve the scientific understanding of how asthma affects a person's w
being. Your careful consideration **of each question is appreciated. All** your answers are voluntary
will be confidential. Please do not **hesitate to ask me to repeat any** question.

Some of these questions refer to Bad Asthma Days, just as on the **daily diary.** Again, YOU **are the** judge
what is a Bad Asthma Day.

Here is a booklet to **help You answer** some of the questions. **Please** do **not** turn to the first page until
receive instructions to do so. (HAND NOTEBOOK) Not all questions are in the booklet and you will
skipping some of the questions in the booklet, so please wait for instructions   before continuing in
booklet.

☐ **highest good day**
7

PART L OTHER ASTHMATICS IN THE HOUSEHOLD

QUESTION 1.   a.   **How many people live in your household?**
      IF I SKIP TO QUESTION 3)

☐☐
8 9

   b.   **Are there other asthmatics in your household?**
     _____ **NO. (0)(SKIP TO PART II)**
     _____ **YES. (1)(CONTINUE)**

☐
10

QUESTION 2.   a.   **Please rate your asthma as either mild (1), moderate (2), or severe (3)**
     _____ **(Rating)**

☐
11

   b.   **Please give the relationships of other asthmatics in the household and rate t
asthma as either mild, moderate, or severe.**

Relationship	MILD (1)	MODERATE (2)	SEVERE (3)
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____

☐
12 13

PART II. EXPENDITURES

QUESTION 3.   **As a result of asthma, what types of medical supplies, household supplies, equipm
and special treatment programs do you and members of your household buy or use,
you would not have purchased or would not use if you (and other members of y
household) did not have asthma? To help you, please look at the list of items on
first page of the notebook, which is titled Question 3.**

   a. **Have you purchased or do you rent** _____ **that you would
otherwise have if no one in your household had asthma? (IF NOT USED, CHE
COLUMN #1)**

   b. **Is this a one-time purchase or something you purchase or rent from time to ti
(CHECK EITHER COLUMN 2 OR COLUMN 3.)**

(CONTINUE THROUGH LIST AND ASK FOR OTHER ITEMS THAT HAVE NOT BEEN LISTED, EVE INFREQUENTLY USED.)

QUESTION 4. a. **Please estimate the one-time purchase price or costs per year of buying or re each item. (COLUMN 4)**

 b. **Is this mostly paid by your household or by a medical payment program (su health insurance, MEDICAL, HMO, etc.)?(WRITE 'YES' OR 'NO' IN COLUMN**

Column	(1)	(2) CHECK IF	(3)	(4)	(5)
[tern	Not used	One time Purchase	Periodic Purchase or Rental	Cost to Buy or Annual Cost	Household Pays Most (Yes/No)
Medications for Asthma*					
Air Purifier					
Intermittent Positive Pressure Breathing Machine (IPPB)					
Hand Held Nebu lization Machine					
Masks					
Oxygen					
Special Treatment Programs SPECIFY) _____					
Relandscaping the Yard					
Other (SPECIFY)					
Other (SPECIFY)					
Other (SPECIFY)					
Other (SPECIFY)					

● **Includes bronchodilators, inhalers, tablets, steroids, etc.**

```
14   5   16   17   18
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GLENDORA-ASTHMA BEHAVIOR AND EXPENDITURE STUDY
WEEKLY DIARY FORM

CODE #_____

Date this diary started _____ _____
                        month   day

Date							
Day							

1. WHEN YOUR DAY STARTED, WHAT DID YOU FEEL MIGHT AFFECT YOUR ASTHMA TODAY?
   CHECK ALL THAT APPLY.

I DIDN'T EXPECT ANY SYMPTOMS TODAY				
ILLNESS, COLDS, FLU				
TENSION, STRESS, ANXIETY				
EXERCISE				
AIR POLLUTION				
ANIMALS, PLANTS, POLLENS				
WEATHER				
A BAD DAY YESTERDAY				
NOTHING IN PARTICULAR/DON'T KNOW				
OTHER (SPECIFY)				

2. WHEN YOUR DAY STARTED, DID YOU THINK YOU MIGHT HAVE ASTHMA SYMPTOMS THAT WOULD RESULT IN A
   BAD ASTHMA DAY (EVEN IF THEY DID NOT OCCUR)?

YES	
NO	

3. HOW DID YOU ASTHMA SYMPTOMS AFFECT YOUR WORK, SCHOOLWORK OR HOUSEHOLD CHORES TODAY
   COMPARED WITH MOST GOOD ASTHMA DAYS? CHECK ALL THAT APPLY.

MORE ENJOYABLE					
LESS ENJOYABLE					
MY PERFORMANCE WAS IMPROVED					
MY PERFORMANCE WAS REDUCED					
I TOOK TIME OFF COMPARED TO MY USUAL SCHEDULE ENTER # OF HOURS TAKEN OFF					
NO EFFECT					

4. IN THE LAST 24 HOURS. ABOUT HOW MANY HOURS DID YOU SPEND N EACH OF THESE TYPES OF ACTIVITIES?

INDOOR HOUSEHOLD CHORES					
OUTDOOR HOUSEHOLD CHORES					
ACTIVE INDOOR LEISURE					
INACTIVE INDOOR LEISURE					
ACTIVE OUTDOOR LEISURE					
INACTIVE OUTDOOR LEISURE					

5. DID YOU CHANGE YOUR LEISURE ACTIVITIES (TIMING OR # HOURS) TODAY TO AVOID HAVING OR WORSENING ASTHMA
   SYMPTOMS THAT YOU WOULD CONSIDER TO BE A BAD ASTHMA DAY?

YES	
NO	

6. DID YOU CHANGE YOUR SLEEP ACTIVITIES (TIMING OR # HOURS N BED) TODAY TO AVOID HAVING OR WORSENING
   ASTHMA SYMPTOMS THAT YOU WOULD CONSIDER TO BE A BAD ASTHMA DAY?

YES	
NO	

ASTHMA BEHAVIOR AND EXPENDITURE STUDY

RESPONDENT NOTEBOOK

ASTHMA BEHAVIOR AND EXPENDITURES (ABE) STUDY
DALY DIARY INSTRUCTIONS

1. **The ABE diary is to be completed at the end of each day after completing the UCLA diary. The UCLA diary entries are very important and must first be completed as accurately as possible.**

2. **Th ABE diary is concerned with the effects of your asthma on your daily activities. Some of the questions refer to *GOOD ASTHMA DAYS and BAD ASTHMA DAYS.* This distinction is for you to judge.**

3. **Some of the questions on the ABE diary refer to days when you start off feeling as THOUGH your asthma might result in ● BAD ASTHMA DAY whether or not this actually occurred.**

    Mark the factors in Question #1 that you were concerned might have made your asthma worse, whether you had a BAD *ASTHMA DAY or not.*

    Answer YES to Question #2 if at the start of your day you thought you might have had a BAD ASTHMA DAY, whether or not it actually occurred.

4. **For Question 3, please assess how your asthma affected your performance ● t whatever paid work, schoolwork and household chores you do. If you ● re ● homemaker or retired, please answer for your housework chores or other activity that you consider work. Include commuting time as part of your work activity.**

5. **Examples of the various categories of activities in Question 4 include:**

 | | |
    |---|---|
    | **Indoor household chores:** | **cooking, cleaning** |
    | **Outdoor household chores:** | **gardening, auto fi x-up, lawn work** |
    | **Active indoor leisure:** | **dancing, bowling, racquet ball** |
    | **Inactive indoor leisure;** | **watching TV, reading, visiting with family and friends, eating** |
    | **Active outdoor leisure:** | **walking, playing ball, bicycling** |
    | **Inactive outdoor leisure;** | **watching sporting events, picnicking, sitting on the porch** |

ASTHMA BEHAVIOR AND *EXPENDITURES* (Au) STUDY
GENERAL QUESTION #1
**(As Part of Diary Instruction #2 and
To Be Retained By interviewer)**

Using the UCLA scale, please circle the highest overall daytime asthma rating that you would still consider to be a GOOD ASTHMA DAY for yourself.

BAD ASTHMA DAYS would be days with an overall asthma rating above this. (Divide Scale into GOOD ASTHMA DAYS and BAD ASTHMA DAYS.)

1	2	3	4	5	6	7
None	Very Miid	Mild	Moderate	Moderately Severe	Severe	Very Severe
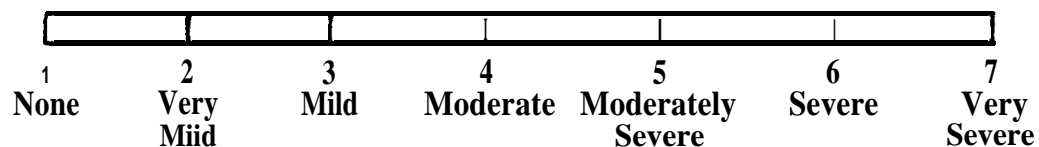
First, we need certain information about you and members of your household. Please answer each of the following questions as completely and as accurately as you can.

1. What is your age? _____ sex? Male _____ Female _____

2. How many members of your household are in each age group below? (put** number in each group or leave blank if none.)

   0-18 yrs. __1__9__4__0__ yrs. — 41-60 yrs. — over 60 yrs.

3. Are you employed, retired, or unemployed? (check one)
   _____ Employed   Retired   <u>Unemployed</u>

4. If you are employed or ware previously employed, what is your occupation? (check one)
   Agriculture, mining or construction _____ Manufacturing production _____ Trade or Service
   _____ Professional _____ Government

5. Has the doctor ever told vw vou have (check as many as apply)
   Asthma   Bronchitis _____ Emphysema _____ Hay fever _____ Heart disease
   Any other respiratory (breathing) disorder (specify) _____

6. Do other members of your family have (check as many as apply)
   Asthma   Bronchitis   Emphysema _____ Hay favor _____ Heart disease
   Any other respiratory (breathing) disorder (specify) _____

7. In the last year, did vw experience prolonged coughing (check one)
   almost never _____ some, but less than 14 days <u>at least</u> 1 4 days
   at least 90 days (3 months)   almost every day
   On most of these occasions how were vow routine activities affected (check one)
   little or no cange in your activities
   you had to restrict your activities and possibly war. confined to bad

8. In the last year, did you experience difficulty in breathing (check one)
   _____ almost never _____ some, but less than 14 days <u>at least</u> 14 days
   at least 90 days (3 months)   almost every day
   On most of these occasions how were your routine activities affected (check one)
   _____ little or no change in your activities
   _____ you had to restrict your activities and possibly were confined to bad

9. In the last year, did vou experience chest pains (check one)
   almost never _____ some, but less than 14 days _____ at least 14 days
   _____ at least 90 days (3 months) _____ almost every day
   On most of these occasions how were your routine activities affected (check one)
   <u>little or no change</u> in youractivities
   <u>you had</u> to restrict vour activities and possibly were confined to bad

10. the last year, did you experience head congestion/eye/ear/throat irritations/sneezing (check one)
    almost never   some but less than 14 days <u>at least</u> 14 days
    at least 90 days (3 months)   almost every day
    On most of these occasions how were your routine activities affected (check one)
    <u>little or</u> no change in your activities
    _____ you had to restrict your activities and possibly were confined to bed

11. Do you smoke cigarettes regularly? <u>Yes</u> _____ No
    If yes, do you smoke _____ lass than 1 pack a day _____ more than 1 pack a day

12. Are you covered by medical insurance (suh as Blue Cross/Eluo Shield, Medicare, Medicaid)?
    _____ Yas   No

13. If you are covered by medical insurance, which of the tallowing does it pay for (check as manv as apply)
    —Visits to doctor's office   Medicine purchased at drugstore   Surgery
    Hospitalization _____ Disability

14. If employed, do you receive compensated sick leave from work?   Yes   No

15. What is the average income of your household par year? (check one)
    Less than $5,000 — $5,001 to $10,000 — $10,001 to $20,000 $20,001 to $30,000
    _____ above $30,000 _____ I would prefer not to answer

16. How long hava you lived in the Tampa area? _____ Years

17. Place of previous residence? _____ City _____ State

18. Your zip code   _____

Now we would like you to tell us about your own values on health. No one likes to be ill or uncomfortable and assume, no one likes to give up money, but sometimes we choose one or the other. For example, if one goes to the doctor for an illness, he or she is choosing to give up money to feel less discomfort.

Each of the following questions concerns symptoms that are associated with respiratory problems you or someone you know may have experienced. For example, coughing or sneezing is associated with a cold. These symptoms may be more or less severe. In the following questions, minor means you could continue with your daily activities with little or no change; and severe means You must restrict your daily activitites and Possibly be confined to bed.

Now we would like you to tell us how much you would pay from your budget to avoid certain unplessant medical symptoms. circle the highest amount you For each symptom, please would pay to avoid it per year. For example, if you would pay at the most $2 to avoid 1 day per year of minor headache, you would answer this way:

To avoid 1 day per year minor head congestion/eye/ear/nose/throat irritations, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

OK, please circle the highest amount you would pay per year.

1. To avoid 1 day per year severe shortness of breath/chest pains, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

2. To avoid 3 months per year minor coughing/sneezing, the most I would pay is:
$0 $ .50 $1 $2 $15 $50 $120 $250 $1,000   per year.

3. To avoid 1 day per year minor head congestion/eve/@w/throat irritations. the most I Would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

4. To avoid 3 months per yew haze in me air, the moat I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1.000   per year.

5. To avoid 1 day per year severe head congestion/eye/ear/throat irritations, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1.000   per year.

6. To avoid 1 week per year severe shortness of breath/cheat pains, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per veer

7. To avoid 3 months per year unpleasant odors in the air, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per Year

8. To avoid 1 day per year minor coughing/sneezing, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

9. To avoid 3 months per year minor shortness of breath/chest pains, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

10. To avoid 1 week per year severe coughing/sneezing, the moat I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

11. To avoid 1 week per year minor head congestion/eye/ear/throat irritations, the most I would pay is:
$0 $ .05 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

12. To avoid 1 day par year unpleasant odors in the air, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

13. To avoid 3 months per year severe coughing/sneezing, the most I would Pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

14. To avoid 1 day per year minor shortness of breath/chest pains, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year

15. To avoid 1 day per year haze in the air, the moat I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   par year.

16. To avoid 3 months per year minor head congestion/eye/ear/throat irritations, the moat I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

17. To avoid 1 day per year severe coughing/sneezing, the most I would pay is:
$0 $ .50 $1 $2 $10 $15 $50 $120 $250 $1,000   per year.

18. To avoid 1 week per year haze in the air, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

19. To avoid 3 months per year severe head congestion/eye/ear/throat irritations, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

20. To avoid 1 week per year minor shortness of *breath/chest* pains, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

21. To avoid 1 week per year unpleasant odors in the air, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

22. To avoid 3 months per year severe shortness of breath/chest pains, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

23. To avoid 1 week per year minor coughing/sneezing, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

24. To avoid 1 week per year severe head congestion/eye/ear/throat irritations, the most I would pay is:

| $0 | $ .50 | $1 | $2 | $10 | $15 | $50 | $120 | $250 | $1,000 | per year. |

Now that you have answered the above questions for yourself, please tell us whether you would pay more, less, or the same for your children (if you have children) or for older members of your family (if there are any).

1. Compared to yourself how much would you pay to avoid health symptoms like thou mentioned in the preceding questinos for *your* children ?

    _____ More   Less   Same   _____ Have no children

2. Compared to yourself, how much would you pay to avoid these symptoms for members of your family over 65 years of age?

    _____ Mom   Less   Same   Have no family over

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